

4.1-4.5 Review Graphing Functions

key

Name _____ Date _____ Period _____

Find the domain of the function algebraically. Write your answer in interval notation. Show work!

1. $f(x) = -3x^2 - 5x + 7$

$(-\infty, \infty)$

2. $f(x) = \frac{x+4}{x(x-9)}$ $x \neq 0, x \neq 9$

$(-\infty, 0) \cup (0, 9) \cup (9, \infty)$

3. $f(x) = \frac{\sqrt{4x-8}}{x^2+5x-50}$ $4x-8 \geq 0$
 $x \geq 2$ & $x \neq -10, x \neq 5$

$(2, 5) \cup (5, \infty)$

4. $f(x) = -\sqrt{x-3} + 11$ $x-3 \geq 0$
 $x \geq 3$

$[3, \infty)$

5. $f(x) = x^2 - 10$

$(-\infty, \infty)$

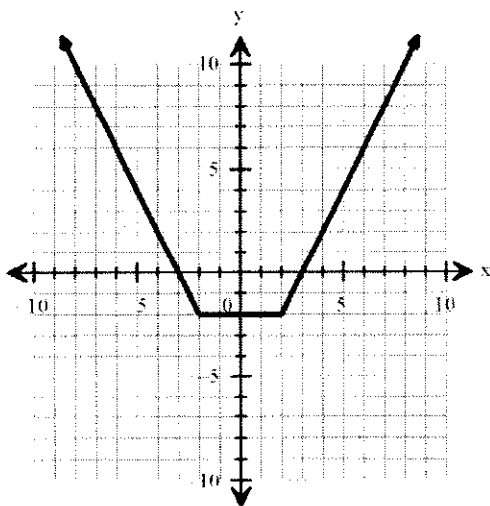
6. $f(x) = \sqrt{-x+15}$

$-x+15 \geq 0$
 $-x \geq -15$
 $x \leq 15$

$(-\infty, 15]$

Analyze the given function.

7. $f(x) = |x+2| + |x-2| - 6$



Domain	$(-\infty, \infty)$
Range	$[-2, \infty)$
x-intercepts	$(-3, 0) (3, 0)$
y-intercept	$(0, -2)$
Intervals of increasing	$(2, \infty)$
Intervals of decreasing	$(-\infty, -2)$
Intervals of constant	$(-2, 2)$
Intervals where Positive	$(-\infty, -3) \cup (3, \infty)$
Intervals where Negative	$(-3, 3)$
Local Maximums	none
Local Minimums	$(-2, -2) (2, -2)$
Symmetry	even
Left End Behavior limit notation	$\lim_{x \rightarrow -\infty} f(x) = \infty$
Right End Behavior limit notation	$\lim_{x \rightarrow \infty} f(x) = \infty$

Find the horizontal and vertical asymptotes of the function. Show work!

8. $f(x) = \frac{2x+1}{x-5}$

H.A.: $\frac{2x}{x} \rightarrow 2$ $\boxed{y=2}$

V.A.: $x-5 \neq 0$ $\boxed{x=5}$

9. $f(x) = \frac{x}{x^2-4}$

H.A.: $\frac{x}{x^2} \rightarrow \frac{1}{x} \rightarrow 0$ $\boxed{y=0}$

V.A.: $x^2-4 \neq 0$, $(x-2)(x+2) \neq 0$ $\boxed{x=2, x=-2}$

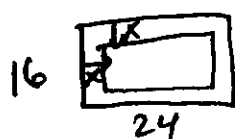
10. A football thrown in the air with initial velocity 50 ft/sec is modeled by $h(t) = -16t^2 + 50t + 4$. If the ball falls incomplete what is the real world domain for this model?

Answer: (0, 3.2 seconds)

Explain your answer in 1-2 sentences.

The amount of time the ball is in the air is between 0 + 3.2 seconds. Graphed and used the calculator to calculate zeros.

11. A hedge x feet wide is planted inside the borders of a garden with dimensions 16 feet by 24 feet. Determine the domain of the area function that describes the reduced garden in terms of x .



$A(x) = (24-2x)(16-2x)$

$(24-2x)(16-2x) \geq 0$

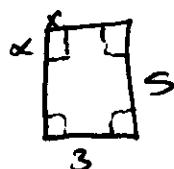
& x can't be larger than 8.

Answer: (0, 8) feet

Explain your answer in 1-2 sentences.

x has to be between 0 + 8 feet in order to have space to still have a garden.

12. A square of side x meters is cut out of each corner of a 3 meter by 5 meter piece of cardboard to form a box. Determine the domain of the volume function in terms of x . Show work!



$V(x) = x(5-2x)(3-2x)$

(0, 1.5 meters)

Answer: (0, 1.5) meters

13. Describe all of the transformations used on the basic function $f(x) = \sqrt{x}$, to obtain the graph of $g(x) = -3\sqrt{x+6} - 1$ and sketch the graph. List the transformations in the correct order and make a table for $f(x)$ and $g(x)$.

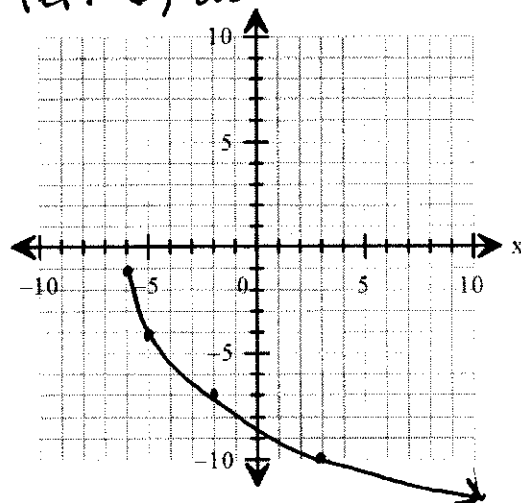
$f(x) = \sqrt{x}$

x	y
0	0
1	1
4	2
9	3
16	4

$g(x) = -3\sqrt{x+6} - 1$

x	y
-6	-1
-5	-4
-2	-7
3	-10
10	-13

Transformations: Reflection across x-axis, vertical stretch by 3, horiz. shift left 6, down 1.



Determine whether each function is even, odd or neither (algebraically). Show work!

14. $f(x) = -x^2 - 5$

$$f(-x) = -(-x)^2 - 5 = -x^2 - 5$$

even

15. $f(x) = 8x^5 + x^3 - x$

$$f(-x) = 8(-x)^5 + (-x)^3 - (-x) = -8x^5 - x^3 + x$$

$$-f(x) = -8x^5 - x^3 + x$$

odd

16. $f(x) = x^3 - 7x^2$

$$f(-x) = (-x)^3 - 7(-x)^2 = -x^3 - 7x^2$$

$$-f(x) = -x^3 + 7x^2$$

neither

Describe a basic parent function and a sequence (in correct order) of transformations that can be used to produce a graph of the given function.

17. $f(x) = -3\sqrt{x-4}$

Parent function: $y = \sqrt{x}$

Transformations: reflection across x-axis, vert. stretch by 3, shift right 4.

18. $f(x) = \frac{1}{2}(x+8)^2 - 3$

Parent function: $y = x^2$

Transformations: vert. shrink by $1/2$, shift left 8, down 3.

Write the equation for the new function that is obtained from the given transformations on the parent function.

19. $f(x) = x^3$: reflect over the y-axis, horizontal shift right 3, vertical shift -6

$$g(x) = f(-(x-3)) - 6 = f(-x+3) - 6$$

$$\boxed{g(x) = (-x+3)^3 - 6}$$

20. $f(x) = |x|$: reflect over the y-axis, a vertical stretch by a factor of 3

$$g(x) = 3f(-x)$$

$$\boxed{g(x) = 3|-x|}$$

Sketch the graph of the function. Be sure to label three points on the graph.

$$21. f(x) = \begin{cases} x^2 + 2, & \text{if } x < 2, \\ 7, & \text{if } x = 2, \\ x - 3, & \text{if } x > 2 \end{cases}$$

Find: a) $f(-6)$

$$(-6)^2 + 2 = \boxed{38}$$

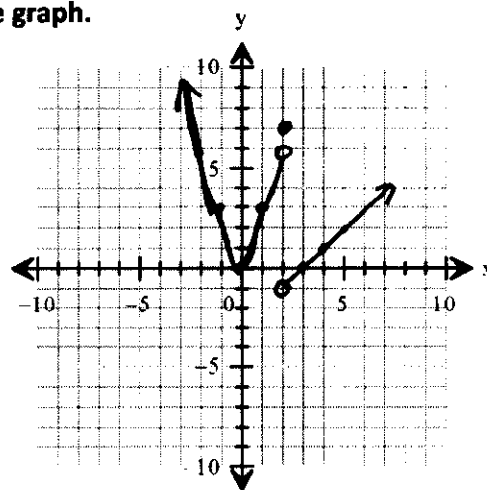
b) $f(2)$

$$\boxed{7}$$

c) $f(8)$

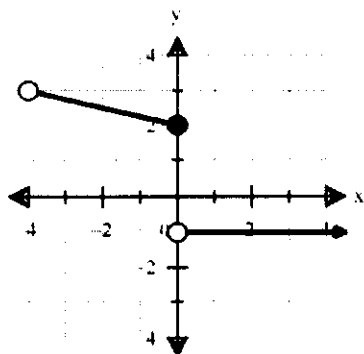
$$8 - 3$$

$$\boxed{5}$$



The graph of a piecewise function is given. Write a definition for the function. Find the domain and range.

22.



$$f(x) = \begin{cases} -1/4x + 2, & -4 < x \leq 0 \\ -1, & x > 0 \end{cases}$$

Domain: $\underline{(-4, \infty)}$

Range: $\underline{[-1], [2, 3)}$

Find the domain, range, asymptotes, intercepts and holes (if any) of each function and then graph the function. Show work!

$$23. f(x) = \frac{x^2 + 2x - 8}{x^2 + 2x - 3} = \frac{(x+4)(x-2)}{(x+3)(x-1)} \quad x \neq -3, 1$$

Domain $(-\infty, -3) \cup (-3, 1) \cup (1, \infty)$

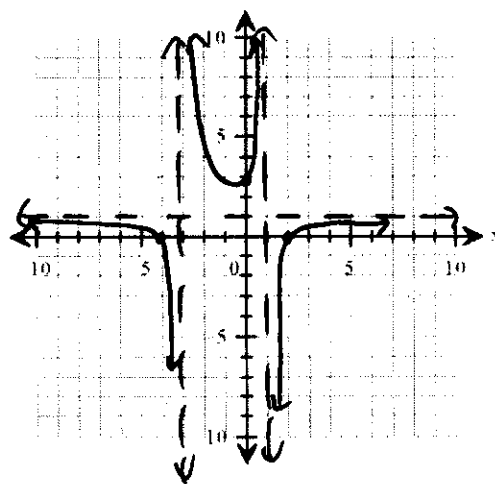
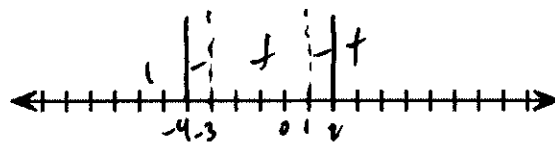
Range $(-\infty, -1) \cup (2.25, \infty)$

Vertical asymptotes $x = -3, x = 1$

Horizontal or oblique asymptote $y = 1$

x-intercept(s) $(-4, 0) (2, 0)$

y-intercept(s) $(0, 8/3)$ hole none



$$24. f(x) = \frac{x-1}{x^2 + 4x - 5} = \frac{x-1}{(x+5)(x-1)} = \frac{1}{x+5} \quad x \neq -5, 1$$

Domain $(-\infty, -5) \cup (-5, 1) \cup (1, \infty)$

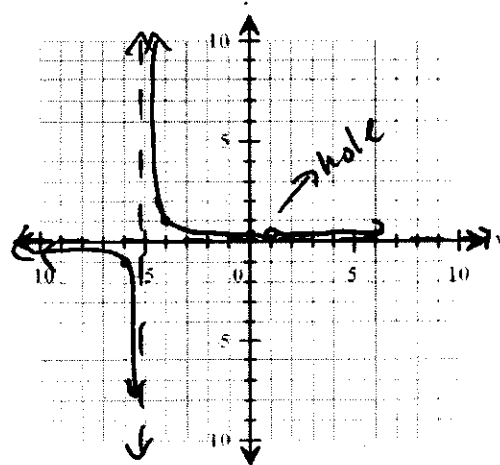
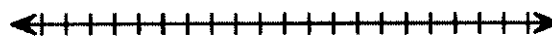
Range $(-\infty, 0) \cup (0, 1/6) \cup (1/6, \infty)$

Vertical asymptotes $x = -5$

Horizontal or oblique asymptote $y = 0$

x-intercept(s) none

y-intercept(s) $(0, 1/5)$ hole $(1, 1/6)$



25. Evaluate the limit based on the graph of $f(x)$ shown

$$\lim_{x \rightarrow 3^-} f(x) = -\infty$$

$$\lim_{x \rightarrow 3^+} f(x) = \infty$$

$$\lim_{x \rightarrow \infty} f(x) = 2$$

$$\lim_{x \rightarrow -\infty} f(x) = 2$$

